

## IODINE

(Data in thousand kilograms, elemental iodine, unless otherwise noted)

**Domestic Production and Use:** Iodine produced in 2002 from three companies operating in Oklahoma accounted for 100% of the elemental iodine value estimated at \$18 million. The operation at Woodward, OK, continued production of iodine from subterranean brines. A second company operated a miniplant in Kingfisher County, OK, using waste brine associated with oil. A third company continued production at Vici, OK, for domestic use and export to Germany. Of the consumers that participate in the annual survey, 24 plants reported consumption of iodine in 2001. Major consumers were located in the Eastern United States. December published prices of crude iodine in drums ranged between \$13 and \$14 per kilogram. The average value of iodine imports through September was \$12.78 per kilogram. Establishing an accurate end-use pattern for iodine was difficult because intermediate iodine compounds were marketed before reaching their final end uses. Estimated world consumption of iodine was 19,000 metric tons.

<b>Salient Statistics—United States:</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002<sup>e</sup></b>
Production	1,490	1,620	1,470	1,290	1,700
Imports for consumption, crude content	5,960	5,430	5,110	5,370	6,080
Exports	2,790	1,130	886	1,480	790
Shipments from Government stockpile excesses	291	221	949	83	27
Consumption:					
Apparent	4,950	5,990	5,420	5,263	7,020
Reported	4,100	4,540	3,990	3,620	NA
Price, average c.i.f. value, dollars per kilogram, crude	16.45	16.15	14.59	13.94	12.78
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, number	40	40	30	30	30
Net import reliance <sup>1</sup> as a percentage of apparent consumption	70	62	77	73	76

**Recycling:** Small amounts of iodine were recycled, but no data are reported.

**Import Sources (1998-2001):** Chile, 67%; Japan, 22%; and Russia, 10%; and other, 1%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/02</b>
	Iodine, crude	2801.20.0000	Free.
	Iodide, calcium or of copper	2827.60.1000	Free.
	Iodide, potassium	2827.60.2000	2.8% ad val.
	Iodides and iodide oxides, other	2827.60.5000	4.2% ad val.

**Depletion Allowance:** 14% (Domestic and foreign).

**Government Stockpile:** In October, the Defense National Stockpile Center announced the fiscal year 2003 Annual Materials Plan would include sales of 454 tons (1,000,000 pounds) of crude iodine.

### Stockpile Status—9-30-02<sup>2</sup>

<b>Material</b>	<b>Uncommitted inventory</b>	<b>Committed inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2002</b>	<b>Disposals FY 2002</b>
Stockpile-grade	1,674	12	1,674	454	27

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**Events, Trends, and Issues:** Chile was the largest producer of iodine in the world, and production was a coproduct from surface mineral deposits used to produce nitrate fertilizer. The two of the largest companies in the world are located in Chile. The largest company in Chile was owned 37.5% each by a Canadian company and a Chilean company. An 18% portion of the Chilean company was owned by a Norwegian company. Product from the second largest company in the world was marketed exclusively by a United States company. Japan was the second largest producer and its production was associated with gas brines.

A Canadian company in a joint venture with an existing Chilean iodine producer constructed a plant to produce iodine from nitrate deposits in the Atacama Desert of Chile. The plant came online in April 2001. Full first-phase production of 720 tons of iodine was achieved in January 2002. Sales in July 2002 were reported to be in excess of \$1.5 million. The company continued to expand its evaporation ponds during 2002 as part of an expansion plan for iodine, potassium nitrate, and sodium sulfate, which will increase iodine production to 1,100 tons per year.

The largest inorganic chemical complex in Asia at Mithapur, Gujarat, India, continued to produce iodized vacuum salt and was the largest producer of iodized salt in India. The Boyadag and Balkan iodine plants in western Turkmenistan were reported to be extracting iodine from waters associated with oil and gas fields. The former Cheleken plant in Turkmenistan is now the Khazar chemical plant, with iodine production of 40 tons per year.

**World Mine Production, Reserves, and Reserve Base:** Reserves and reserve base estimates for China have been significantly decreased based on new information from that country.

	Mine production		Reserves <sup>3</sup>	Reserve base <sup>3</sup>
	2001	2002 <sup>a</sup>		
United States	1,290	1,700	250,000	550,000
Azerbaijan	300	300	170,000	340,000
Chile	10,500	10,500	9,000,000	18,000,000
China	500	500	4,000	120,000
Indonesia	75	75	100,000	200,000
Japan	6,100	6,100	4,900,000	7,000,000
Russia	300	300	120,000	240,000
Turkmenistan	150	150	170,000	350,000
World total (rounded)	19,200	19,600	15,000,000	27,000,000

**World Resources:** In addition to the fields listed in the reserve base, seawater contains 0.05 part per million iodine, or approximately 34 million tons. Seaweeds of the Laminaria family are able to extract and accumulate up to 0.45% iodine on a dry basis. Although not as economical as the production of iodine as a byproduct of gas, oil, and nitrate, the seaweed industry represented a major source of iodine prior to 1959 and is a large resource.

**Substitutes:** Bromine and chlorine could be substituted for most of the biocide, ink, and colorant uses of iodine, although they are usually considered less desirable than iodine. Antibiotics and mercurochrome also substitute for iodine as biocides. Salt crystals and finely divided carbon may be used for cloud seeding. There are no substitutes for iodine in some catalytic, nutritional, pharmaceutical, animal feed, and photographic uses.

<sup>a</sup>Estimated. NA Not available.

<sup>1</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>2</sup>See Appendix B for definitions.

<sup>3</sup>See Appendix C for definitions.